

Drowning in Indiana
Data on Children and Adolescents
May 10, 2007

Highlights

Mortality

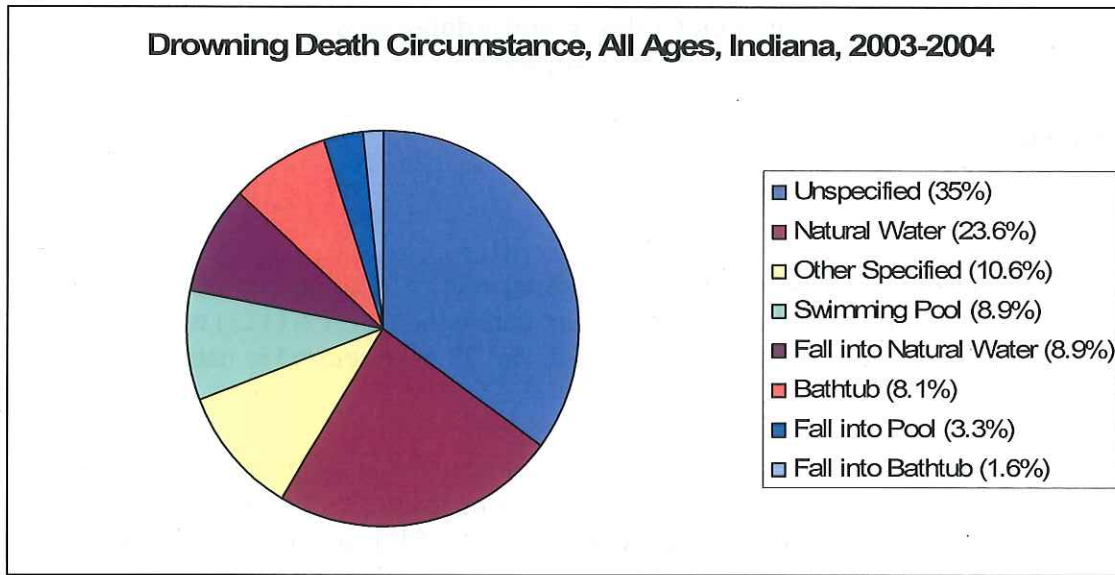
Between 2003 and 2004, unintentional injuries were the 5th leading cause of death for Hoosiers, claiming 4,591 lives. Of all unintentional injuries, 2.7% (123) were due to drowning: 35% of the deaths were unspecified, and 23.6% occurred in natural water (Figure 1).

For those 1-19 years of age, unintentional injuries were the leading cause of death with 6.8% (34/503) of the deaths due to drowning. The majority (35.3%) of deaths were unspecified, followed by drowning in natural water (26.5%) and drowning in a swimming pool (17.6%) (Figure 2). Unintentional injuries were the third leading cause of death among those under one year of age with 3.4% (3) of deaths due to drowning all of which occurred in bathtubs (1).

From birth to age 19, there were 37 drowning deaths. Children 2-4 years of age had the highest number (13), followed by those 11-13 and 17-19 each with six deaths in each age category. Table 1 describes the circumstances surrounding the drowning deaths by age group. Death due to drowning in a bathtub occurred only in those one and under. Drowning deaths in natural water were common for all ages except those under one and adolescents ages 8-10. Swimming pool drowning deaths occurred only in those aged 2-7 years. Drowning following a fall into a swimming pool were specific to children ages 1-4.

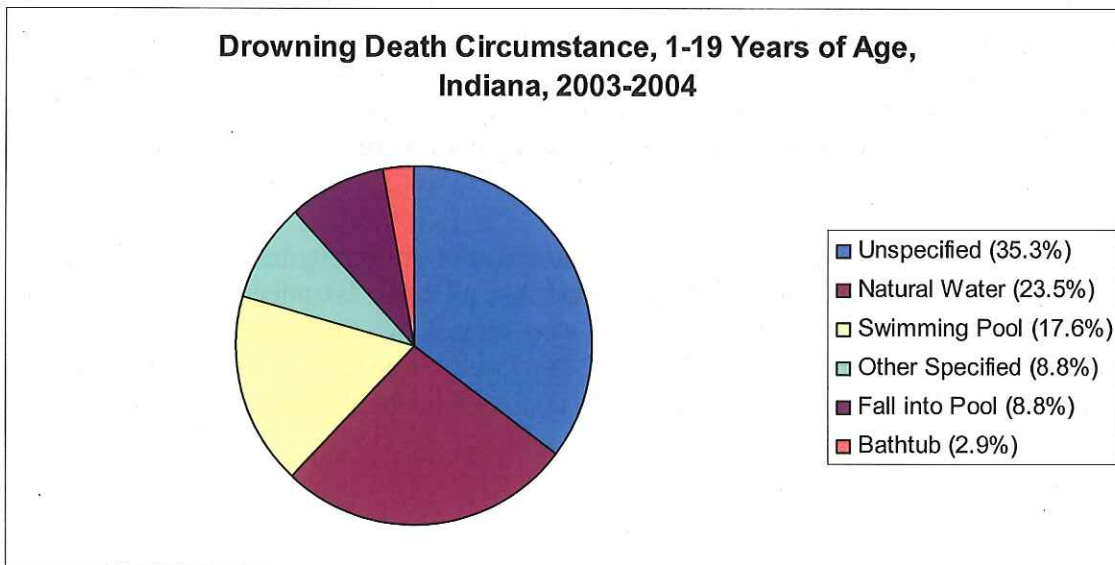
From 2003 to 2004, Whites had the highest numbers of drowning deaths compared to Blacks, American Indians/Alaska Natives, and Asian Pacific Islanders. However, when comparing rates, Blacks (1.68 per 100,000) were almost two times more likely to drown than Whites (0.94 per 100,000) (Table 2). Males were three times more likely to drown than females (1), and males had higher rates than females in all race categories (Table 3).

Figure 1



(Source: CDC, WISQARS)

Figure 2



(Source: CDC, WISQARS)

**Table 1: Drowning Death Circumstances by Age Group,
1-19 Years, Indiana, 2003-2004**

	>1 Yr	1 Yr	2-4 Yrs	5-7 Yrs	8-10 Yrs	11-13 Yrs	14-16 Yrs	17-19 Yrs
Deaths	3	5	13	2	1	1	6	6
Unspecified (12)		20%	38.5%		100%		66.7%	16.7%
Natural Water (9)		20%	7.7%	50%		100%	33.3%	50%
Other Specified (3)		20%						33.3%
Swimming Pool (6)			38.5%	50%				
Bathtub (4)	100%	20%						
Fall into Pool (3)		20%	15.4%					

(Source: CDC, WISQARS)

**Table 2: Unintentional Drowning Deaths and Rates per 100,000 by Race, Ages 1-19,
Indiana, 2003-2004**

Race	Number of Deaths	Population***	Age-Specific Rate
White	29	3,078,255	0.94
Black	*	416,229	*
Am Indian/AK Native	*	11,097	*
Asian/Pac Islander	*	44,224	*
Total	37	3,549,805	1.04

(Source: CDC, WISQARS)

* Rates based on 20 or fewer deaths may be unstable.

*** Population estimates are aggregated for multi-year reports to produce rates.

Table 3: Unintentional Drowning Deaths and Rates per 100,000 by Race and Gender, Ages 1-19, Indiana, 2003-2004

Race	Sex	Number of Deaths	Population***	Age-Specific Rate
White	Males	*	1,578,698	*
	Females	*	1,499,557	*
		29	3,078,255	0.94
Black	Males	*	211,672	*
	Females	*	204,557	*
		*	416,229	*
Am Indian/AK Native	Males	*	5,546	*
	Females	*	5,551	*
		*	11,097	*
Asian/Pac Islander	Males	*	22,338	*
	Females	*	21,886	*
		*	44,224	*
Total		37	3,549,805	1.04

(Source: CDC, WISQARS)

* Rates based on 20 or fewer deaths may be unstable.

*** Population estimates are aggregated for multi-year reports to produce rates.

Morbidity

Not all drowning incidents result in death. Non-fatal drownings can cause brain damage that result in long-term disabilities such as memory problems, learning difficulties, and permanent loss of basic functioning such as persistent vegetative state. Nearly 50% of drowning victims treated in emergency departments (ED) need hospitalization or to be transferred for higher levels of care compared with 3-5% of people treated in EDs for other reasons (2).

Emergency Department Data

During 2004 and 2005, there were 1,027,846 emergency department visits with a primary diagnosis for injury or poisoning (ICD-9-CM) codes 800-999. Of the 1,027,846, 168 were visits related to drowning or submersion (ICD-9-CM code 994.1) and represented less than 1% of all ED visits.

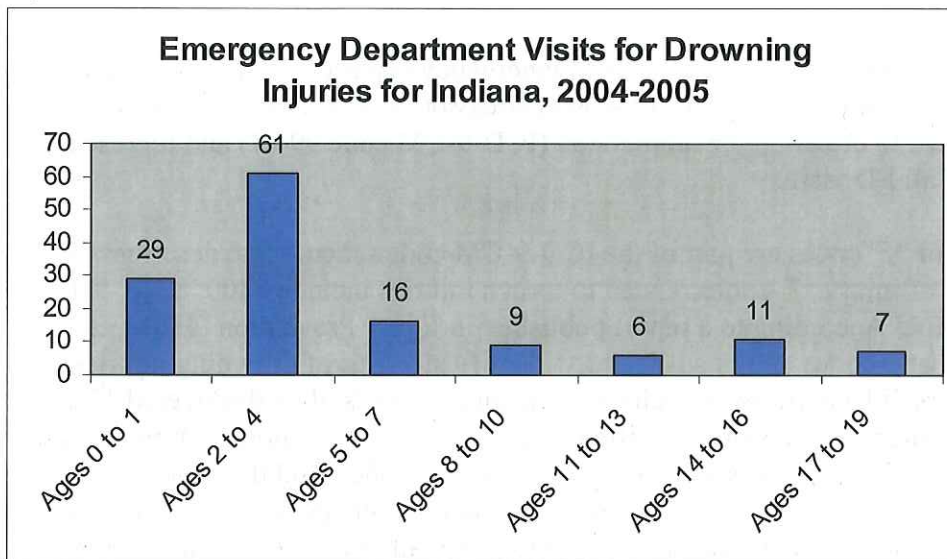
External codes or "E" codes are part of the ICD-9-CM code scheme that describes the cause or source of injury. E-codes related to drown injuries include 8300, 8320, 910, 954, 964, and 984. According to a report published in *Injury Prevention* (1998), the authors found that e-codes do not sufficiently identify all cases of drowning injuries. When the authors did a narrative search of the hospital records, they discovered 17.7% more drowning injuries than were identified by drowning e-codes alone. Drownings that occur under other circumstances are coded under other e-codes, and therefore not all drowning injuries are identified. For example, a motor vehicle going off the highway into the water would be coded as a motor vehicle crash not as a drowning injury (3). Therefore because of the inconsistency and underestimation identified with drowning injury e-codes, ICD-9 codes will only be used in this report.

Of the 168 victims, 82.7% (139/168) of the patients seen for drowning injuries were from birth to 19 years of age. The majority (64.7% or 90/139) of the victims were ages 4 and under (Figure 3). Females accounted for 41.7% (58/139) of the children/adolescents seen, and 58.3% (81/139) were male. Forty percent (81/139) of drowning injuries involved White males, and 32.4% (45/139) involved White females (Figure 4).

The majority of drowning incidents occurred in the warmer months of the year. Over 74% (103/139) of the drowning injuries occurred from May through August with 69 injuries occurring in June and July (Figure 5).

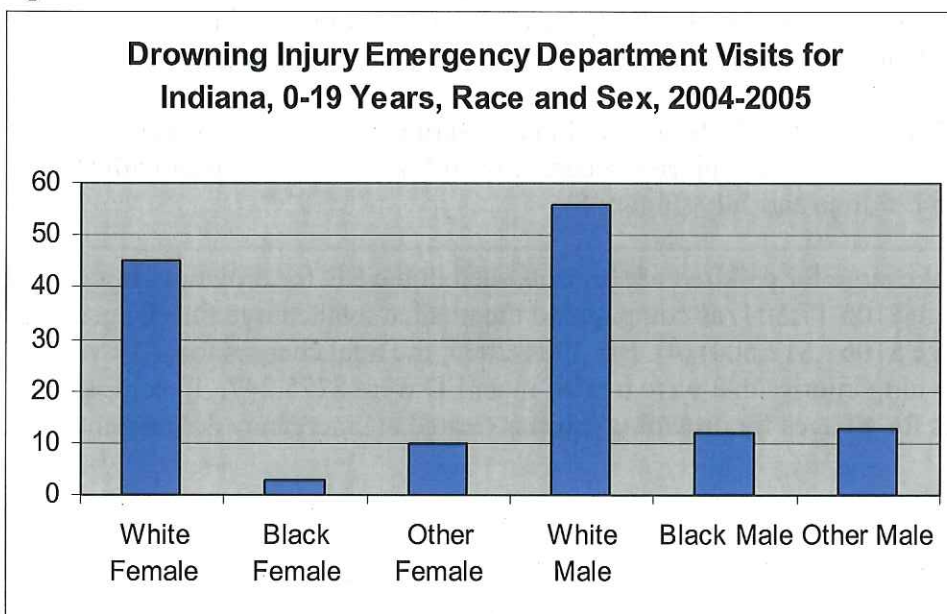
The median total charge for children/adolescents seen in the ED for drowning injury was \$1,690.00 (Range \$106-17,604) as compared to the median total charge for all ages of \$1,528.00 (Range \$106 - \$17,604) (4). For 2004-2005, the total charges for 0-19 year-olds due to drowning injuries that were treated in an ED were \$275,247. In comparison, the total charges for all ages for drowning injuries treated at emergency departments were \$324,946.

Figure 3



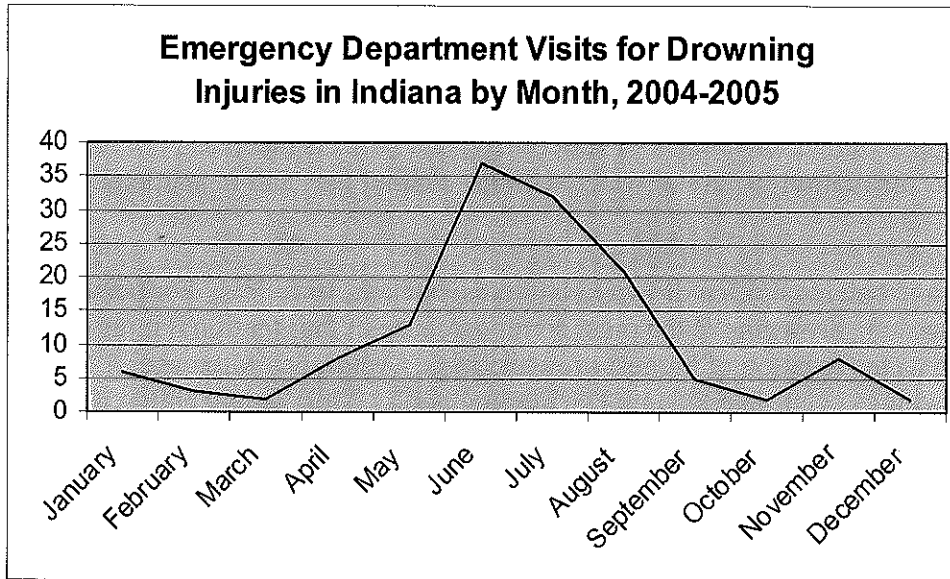
(Source: Indiana State Department of Health, Injury Prevention Program)

Figure 4



(Source: Indiana State Department of Health, Injury Prevention Program)

Figure 5



(Source: Indiana State Department of Health, Injury Prevention Program)

Inpatient Data

From 2004 to 2005, there were 63,499 inpatient hospitalizations with a primary diagnosis of injury or poisoning. Of these, 48 were drowning-related injuries with 68% (33/48) of the hospital admissions for people ages 0-19. While a large number of patients, specifically children, need to be seen in an EDs due to drowning related injuries, the majority do not need to be admitted to the hospital. However, inpatient admissions are still of importance. Please note that graphs are not provided due to small numbers in most categories.

Of the 33 children/adolescent patients admitted to the hospital, 63.6% (21/33) of the victims were ages 4 and under. School age children, ages 5-10, accounted for over 27% (9/33) of the admissions due to drowning, and adolescents ages 14-19 accounted for 9% (3/33). There were no admissions for children ages 11-13 during 2004-2005. Females accounted for 33.3% (11/33) of the children/adolescents seen, and 66.6% (22/33) were male. The majority of drowning injuries involved White males (13/33, 39.4%) followed by White females (7/33, 21.2%).

The majority of drowning incidents occurred in the warmer months of the year. Over 48% (16/33) of the drowning injury hospital admissions occurred from June through July.

The median total charge for children/adolescents admitted to the hospital for drowning injuries was \$7,448.00 (Range \$2,020-241,486) as compared to the median total charge for all ages of \$10,201.00 (Range \$2,020-241,486) (4). For 2004-2005, the total charges for 0-19 year-olds due to drowning injuries who were admitted to the hospital were \$1.1

million. In comparison, the total charges for all ages for drowning injuries treated at EDs were \$1.6 million.

Risk Factors

Risk factors for drowning include lack of supervision and barriers (such as pool fencing), seizure disorders, recreation in natural water settings, alcohol use, and recreational boating (5).

Children under age one most often drown in bathtubs, buckets, or toilets. For persons with seizure disorders, drowning is the most common cause of unintentional injury death, with the bathtub as the location of highest drowning risk. Among children ages 1 to 4 years, most drownings occur in residential swimming pools. Most young children who drowned in pools were last seen in the home, had been out of sight less than five minutes, and were in the care of one or both parents at the time. As age increases, the percent of drownings in natural water settings increases with the majority of drownings in those over 15 years of age.

Alcohol use is involved in about 25-50% of adolescent deaths associated with water recreation. Alcohol affects balance, coordination, and judgment, and its effects are heightened by sun exposure and heat. Alcohol was involved in about one-third of all reported boating fatalities.

Boating carries risks for drown injury and death. In 2005, the United States Coast Guard received reports for 4,969 boating incidents. The majority (3,451) of participants were reported injured, and 697 died in boating incidents. Among those who drowned, 87% were not wearing life jackets. Seventy percent of boating fatalities from 2005 were caused by drowning (5).

References

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3. Smith, G., Langley, J. Drowning Surveillance: How well do E codes identify submersion fatalities? *Injury Prevention* 1998; 4:135-139.
4. Indiana State Department of Health Injury Prevention Program. Indiana Hospital Discharge Data, 2003–2005.
5. Centers for Disease Control and Prevention. Water-Related Injuries: Fact Sheet Available: <http://www.cdc.gov/ncipc/factsheets/drown.htm>.